MIPP-NOTE-HARD-22
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E907 TPC

Power-On / Power-Off Procedures
Emergency Procedures
Expert Contact Information

Abstract

This note explains

How to Turn On/Turn Off:

- the Chiller and Water Pump
- the Low Voltage Power Supplies
- the VME Crates
- the Cathode High Voltage Power Supply
- the Anode High Voltage Power Supply

How to Ramp Up/Down:

- the Cathode Voltage
- the Anode Voltages

How to Check the Gas System for normal operation.

In Case of Emergency:

- Problem (smoke, . . .) in the VME Crates
- Problem in the Cathode HV Supply
- Problem in the Anode HV Supply
- Problem (smoke, . . .) in the Power Supply Racks
- Problem in the TPC:
  - Smoke
  - Water leak
  - Sparking sound
  - Gas leak
- Problem in the Chiller or Water Pump
- Any water leak

How to Contact the Experts.

TPC Water

The TPC Water system skid is 10 m upstream of the TPC on the west side, next to the BCKOV2 head. The picture below identifies the main controls and gauges.

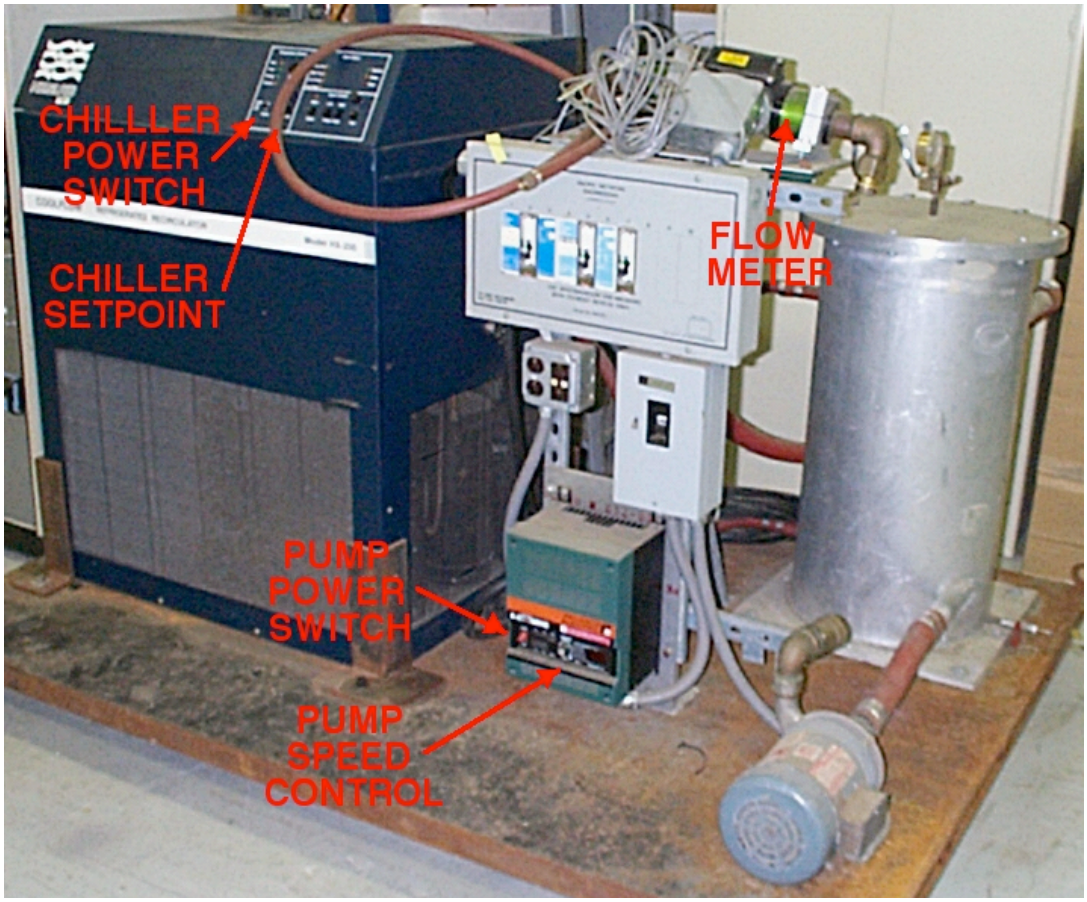
Turning ON the TPC Water

To turn ON the TPC Water:

1. Turn ON the chiller.
   The switch is on the front panel; toggle it up to `START`, then release it to `ON`.
   The numeric display shows the current water temperature.

The chiller setpoint temperature is 20°.
To check the setpoint hold down the SETPOINT button, which displays the setpoint on the numeric display.
To adjust the setpoint, hold down the SETPOINT button while adjusting the knob. Set it to 20°.

2. Turn ON the circulation pump.
   The switch is the red one on the green motor speed control box near the floor. Toggle it up to START, then release it to ON.
   The numeric display shows the current pump speed.
   The pump speed setpoint is nominally 36, but should be adjusted to achieve the proper flow rate in step 3, below.
   To adjust the speed turn the SPEED knob.
3. Check the flow rate.
   The flow meter above the pump should read 15 gpm.
   If it does not, adjust the pump speed as in step 2, above.
4. Check for leaks.
   Take a quick look for leaks:
   In the hose connections at the back of the water skid.
   In the hose connections at the front of the TPC for the main supply/return and the cross-over manifolds.
   Under the TPC.
   If leaks are found, turn off the water system.



Turning OFF the TPC Water

In the case of

- any water leak
- any problem with the chiller or water pump

1. turn off the water system,

2. CALL an EXPERT.

To turn OFF the TPC Water:

1. Turn OFF the circulation pump.
2. Turn OFF the chiller.

Contents

TPC Low Voltage Power Supplies

The TPC Low Voltage power supplies are just upstream of JGG in RR07-RR08 on the east side and RR09-RR10 on the west side. The picture below identifies the switches in RR07-RR08.

Turning ON the TPC Low Voltage Power Supplies

To turn ON the TPC Low Voltage supplies:

1. Turn ON the Chiller and Pump.
2. Turn ON the `AC POWER MASTER SWITCH`. The switch is on the 2U panel near the top of RR07.
3. Reset the `CLK` and `WATER` interlocks. Initially the `CLK` and `WATER` lamps will be lit on the `LOW VOLTAGE P.S. MASTER INTERLOCK`. To reset these interlocks, press the `RESET` button below each lamp.
4. Reset the interlock chain for each rack. At each rack (RR07-RR10), press any `RESET` button on any `EOS TPC POWER SUPPLY`. You may have to hold the `RESET` button for a second to get all the supplies in the rack to latch, or you may need to try a short press. ;)
5. Verify that all enabled supplies are on. The `A`, `B`, `C`, `D`, trouble lamps on the `LOW VOLTAGE P.S. MASTER INTERLOCK` are illuminated when an enabled power supply channel is off. When all enabled channels are latched on, the lamps goes off.

[Image: Photo of RR07-RR08 with controls labeled.]

Turning OFF the TPC Low Voltage Power Supplies

In the case of

- Smoke or alarming smoke detector from the Power Supply racks, RR07-RR10;
- Smoke or alarming smoke detector from the TPC;
- Any water leak at the TPC;

1. Turn OFF the TPC Low Voltage Power Supplies.
2. For any water leak at the TPC turn OFF the Water system.
3. CALL an EXPERT.

To turn OFF the TPC Low Voltage power supplies:

1. Turn off all `EOS TPC POWER SUPPLIES`.
   Press the `P.S. SHUTDOWN` button on the `LOW VOLTAGE P.S. MASTER INTERLOCK`.
2. Turn off the `AC POWER MASTER SWITCH`.

Contents

VME Crates

The VME Crates are located in RR04-RR05 upstream of the JGG on the east side. The picture below identifies the switches in RR04-RR05.

Turning ON the VME Crates

To turn ON the VME Crates:

1. Turn ON each crate using the black switch at the bottom of the front panel.
   If the crate does not turn on, check the position of the red switch on the back, which must also be on.

[Image: Photo of VME Crates with switches labeled.]

Turning OFF the VME Crates

In the case of

- Any problem with the VME Crates

1. Turn OFF the VME Crates,
2. CALL an EXPERT.

To turn OFF the VME Crates:

1. Turn off each crate using the black switch at the bottom of the front panel.

Contents

Cathode High Voltage Supply

The Cathode High Voltage Supply is located in RR04 upstream of the JGG on the east side. The supply is near the bottom of the rack The picture below identifies the controls on the front panel.

Turning ON the Cathode High Voltage Supply

To turn ON the Cathode High Voltage Supply:

1. Turn ON the Cathode High Voltage Supply using the black power switch on the left side of the chassis.
2. Enable the high voltage output, using the red switch on the right side of the chassis.

[Image: Photo of Cathode High Voltage Supply with controls labeled.]

Ramping the Cathode Voltage

To ramp the Cathode voltage manually:

1. Turn ON the Cathode supply.
2. Set the current limit to 0.12 mA.
   To set the current limit
   a. Press LIMIT.
   b. Press CURRENT.
   c. Set 0.12 mA on the display using the knob.
   d. Press ENTER.
3. To ramp the voltage in steps:
   a. Press SET.
   b. Press VOLTS.
   c. Set the desired voltage on the display using the knob.
   d. Press ENTER.

   Suggested voltage steps and nominal current for a dry chamber with nitrogen gas:

Voltage (V)	Current (mA)
100	0.0013
1000	0.0085
3000	0.0245
5000	0.0408
7000	0.0568
8000	0.0647
9000	0.0927
9500	0.0767
10,000	0.0805

   After each step, wait for the current to settle to within 0.0002 of the expected value before proceeding to the next step. (The field cage resistor ladder is 124 Mohm, which sets the current at each voltage.)

   If the supply trips (because of the current limit), it sets the output to 0 V. You can "catch" it before it gets all the way down by quickly noting the approximate voltage and entering a new set voltage that is nearby. For example, if you note the voltage is 3567 V and dropping, set the voltage to anything in the approximate range 3000-4000 V and you should be able to clear the trip and keep the cathode from ramping completely down. Then restart the step ramp at the next step voltage.

4. To ramp the voltage continuously:
   a. Press ADJUST.
   b. Press VOLTS.
   c. Control the voltage directly using the knob.

      CAUTION: The knob is rate sensitive. Small twitches can cause VERY large changes in the setting, causing the current limit to trip.

      > ". . . the [cathode] need[s] love and a steady hand . . ."

   d. When you reach the desired voltage, press ENTER.

To ramp the Cathode voltage automatically:

Automatic ramps under computer control are not implemented yet.

Turning OFF the Cathode Voltage

In the case of

- Sparking sounds from the TPC
- Any problem with the Cathode HV Supply

1. Turn OFF the Cathode HV supply,
2. CALL an EXPERT.

To turn OFF the Cathode HV supply:

1. Turn off the high voltage output, using the red switch on the right side of the chassis.
   If sparking persists turn off the Anode supply.
2. Monitor the cathode voltage.
2. When the cathode voltage is <50 V turn off the supply using the black switch on the left side of the chassis.

Contents

Anode High Voltage Supply

The Anode high voltage supply is the LeCroy 1440 HV chassis at the bottom of RR05, upstream of the JGG on the east side. The picture below identifies the switches on the front panel.

Turning ON the Anode High Voltage Supply

To turn ON the Anode HV supply:

> CAUTION: This supply is used by the T0 counters, the BCKOV counters, the TPC, the CKOV, and the TOF. Be careful only to modify settings for the intended detector.

1. Turn ON the `AC POWER` switch.
2. Press the `HV ENABLE` button to illuminate the `READY` lamp.

[Image: Photo of Section with controls labeled.]

Ramping the Anode Voltage

To ramp the Anode voltage:

- The voltage can only be changed using the serial control interface.
- The nominal operating voltage is 1300-1350 V.

Turning OFF the Anode High Voltage Supply

In the case of

- Sparking sounds from the TPC that persist after the Cathode has been turned off,
- Any problem with the Anode supply,

1. Turn OFF the Anode supply,
2. CALL an EXPERT.

To turn OFF the Anode supply:

1. Press the `HV ENABLE` button to extinguish the `READY` lamp.
2. Turn OFF the `AC POWER` switch.

Contents

TPC Gas System

The TPC gas rack is located upstream of the JGG on the west side, near to RR09. The picture below identifies the relevant gauges.

Normally the gas system should only be operated by an expert. Shifters should check the gas system regularly.

To CHECK the Gas system under normal flow conditions:

1. Verify that the raw supply pressure on `PI-01` is in the 3-7 psi range.
2. Verify that the regulated pressure on `PI-03` is in the 1.8-2.2 psi range.
3. Verify that the TPC inlet pressure on `PI-02` is in the 0.45-0.5 inches of water range.
   If this pressure is > 1 inch of water then turn off the Gas system.
4. Verify that the TPC outlet pressure on `PI-04` is in the 0-0.2 inches of water range.
   If this pressure is > 1 inch of water then turn off the Gas system.
5. Verify that the rotameter ball on `FI-01` is in the 100-120 mm range.
6. Verify that the `MAIN BUBBLER, B1` is actively bubbling.

In the case of

- Any of the above readings are out of range

1. CALL an EXPERT.

[Image: Photo of Section with controls labeled.]

Turning OFF the Gas System

In the case of

- Any gas leak,
- Overpressure on the TPC inlet or outlet, `PI-02` or `PI-04`,

1. Turn OFF the Gas system,
2. CALL an EXPERT.

To turn OFF the Gas system:

1. Close the P10 supply valve, `MV-03`, by turning the short (arrow) side of the handle to the `OFF` label.
2. CALL an EXPERT.

Contents

Expert Contact Information

Expert	email	Phone		
		Preferred	Backup 1	Backup 2
Peter Barnes	pdbarnes@llnl.gov	925-422-3384 (W)	510-610-0366 (C)	510-526-0365 (H)
Mike Heffner	mheffner@llnl.gov	925-422-6762 (W)	925-961-0657 (H)	
Phone locations: (W) work, (C) cell, (H) home.				
